

# USING THE INFERIOR MESENTERIC ARTERY FOR THE THIRD RENAL RE-TRANSPLANTATION: A CASE REPORT

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## ABSTRACT

A 32 year old man underwent renal transplantation for the third time. This procedure was performed in December 1994, using the kidney of a living unrelated donor. The first transplanted kidney remained in the body after rejection but the second one was removed due to trauma.

End-to-end anastomosis of the renal artery to the inferior mesenteric artery was performed and the ureter was reimplemented to the bladder by Lich's technique. The post-operative period went on quite normally and no surgical complication or renal rejection was observed. The transplanted kidney continues to function normally after more than 18 months. In reviewing the medical literature and papers, we did not find any report on using the inferior mesenteric artery for renal transplantation.

We recommend using the inferior mesenteric artery for renal re-transplantation in cases in which no other suitable artery exists. Since there would be no need for aortic dissection and because of rough similarity between the diameters of the renal artery and inferior mesenteric artery, the potential risk of vascular complications would be less.

**Keywords:** Transplantation, renal;

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## INTRODUCTION

The history of renal re-transplantation dates back to the pre-cyclosporine era, during which various reports on graft survival rate and patient survival rate were presented.<sup>4,6</sup> By using cyclosporine, there was a considerable increase in graft survival rates. Subsequently, more cases of grafts, repeated for the second, third, and fourth times were reported.<sup>1,3,14,21</sup>

Re-transplantation, especially for the third and fourth

times, is technically rather difficult.<sup>15</sup> Various arteries have been used to carry out such grafts.<sup>12,13</sup> In this paper, a case study involving the use of the inferior mesenteric artery for a third renal transplantation is presented.

## Case report

A 32 year old man underwent kidney transplantation for the third time. The kidney was harvested from a living unrelated donor. The first graft was performed three years prior to the third, and the transplanted kidney was left in the patient's body despite the fact that it was rejected. The second transplant was performed about one year after the first and the kidney was taken out of the patient's body due to blunt trauma. The first transplanted kidney was located

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on the right side and its artery was anastomosed to the right internal iliac artery. The second one was placed on the left side and an end-to-side anastomosis was performed between the renal artery and the left external iliac artery.

In order to conduct the third renal transplantation, the abdominal wall was opened via a lower midline incision. Extensive adhesions surrounding the common and external iliac arteries made them virtually inaccessible. The task of getting access to and freeing the inferior vena cava and aorta was not easy either. The inferior vena cava was isolated to the extent possible, its anterior portion was occluded by a Satinsky clamp and an end-to-side anastomosis between the renal vein and IVC was performed. Next, the inferior mesenteric artery was dissected and after we ascertained that its ligation would not negatively affect the perfusion of the sigmoid colon, we ligated its distal portion and an end-to-end anastomosis was established between it and the renal artery with Growth Factor Sutures (GFS). Finally, using the Lich technique, the ureter was reimplanted to the bladder dome while it contained a stent.

Subsequent to the operation, the patient was placed under continuous observation. The post-op period went on without any urologic or vascular complications or any signs of renal rejection. More than one year and a half after the completion of the surgical procedure, the transplanted kidney is still functioning normally and the patient's serum creatinine level is steady at 1.10 mg/dL and his blood pressure has never exceeded 130/80.

### DISCUSSION

Several reports have quoted the graft survival rate to be less in re-transplantations compared to primary kidney transplantations.<sup>4,16</sup> On the other hand, other reports indicate the survival rate to be equal to that of primary transplantations.<sup>1,6,14</sup> It is generally believed that if the first transplanted kidney survives and functions normally for over one year, and also remains in the body despite rejection, the re-graft survival rate will be more than cases in which the transplanted kidney survives for less than one year or is removed from the patient's body.<sup>3,21,22</sup> No apparent justification has been reported for this phenomenon.

With the passage of time and increasing re-graft survival rates, surgeons have been performing third and fourth grafts, including a number of very successful cases.<sup>2,5,6</sup>

Rejection of transplanted kidney is a well-known phenomenon for which various solutions have been proposed. Different re-transplantation techniques have been known to date, most of which represent technically difficult procedures.<sup>8,15,17</sup> The arteries which have so far been utilized for this purpose include external iliac, internal iliac, common iliac, inferior epigastric, aorta, and splenic artery.<sup>7,11,18,23</sup> Usually, the internal iliac artery is used in a primary kidney

transplantation<sup>12</sup> and in case of rejection, most surgeons prefer to use the contralateral external iliac artery for the second graft.<sup>12</sup>

The external and internal iliac arteries are not usually used in the third or fourth grafts. Furthermore, if the transplanted kidneys remain in a patient's body, it is likely that use of the common iliac artery may not be possible either. Thus, two alternatives remain; use of the aorta (intra- or extraperitoneal approach)<sup>17</sup> and orthotopic renal transplantation. In an orthotopic renal transplantation, left nephrectomy is first performed and after the new kidney is transplanted, its artery is anastomosed to the splenic artery and its vein is connected to the recipient's renal vein. Finally, pelvis-to-ureter anastomosis is performed.<sup>8</sup>

The inferior mesenteric artery may be used to perform the third renal transplantation. The left colic, sigmoidal, and superior rectal arteries are its main branches and are responsible for perfusion of the descending colon, sigmoid, and the upper part of the rectum.<sup>13</sup> This artery, along with the middle colic artery, forms the Drummond arterial arch in the transverse mesocolon. If this arch is efficient, it will be capable of perfusing the descending colon after ligation of the inferior mesenteric artery.<sup>13</sup> On the other hand, the inferior mesenteric artery is connected inferiorly to the middle rectal artery, which is a branch of the internal iliac artery. Thus, after ligation of this artery, the blood supply of the sigmoid and rectum will be carried out by the middle and inferior rectal arteries.<sup>13</sup> The inferior rectal artery is a branch of the pudendal artery, which in turn is branched from the internal iliac artery.

As may be observed, the blood supply of the distal colon is such that, provided there exists no anomaly or pathologic process, the inferior mesenteric artery may be taken out of this overall set without causing any disturbance to perfusion of any parts.<sup>20</sup>

Utilization of the inferior mesenteric artery to conduct renal re-transplantation has many advantages, to some of which we will refer below.

(A) Dissection of the aorta is associated with certain risks and complications and prolongs the operation. Moreover, in order to use the aorta, it is necessary to temporarily occlude its lumen partially or completely, which can introduce additional risks and complications. By utilizing the inferior mesenteric artery, there would be no need to manipulate the aorta and as such, the potential risks and complications of such an action would be drastically reduced.

(B) The diameters of the inferior mesenteric and renal arteries are nearly equal and in this method the anastomosis is performed using an end-to-end technique. Since transplant surgeons, in most cases, use the same technique to perform anastomosis between the internal iliac and renal artery, they have extensive experience in it and this will lower the likelihood of vascular complications.

(C) The wall thickness of inferior mesenteric artery and renal artery are nearly equal and as such the risk of stricture formation at the anastomosis will be less than when utilizing the aorta. It is worth noting that if an end-to-side anastomosis is performed between two arteries of variable wall thickness, the risk of the occurrence of stricture and vascular complications will increase.<sup>10</sup>

(D) Using this technique, the transplanted kidney will be located closer to the bladder, which will lead to easier anastomosis of the ureter. A minimal length of the ureter will also be required.

(E) Placement of the kidney in the peritoneal cavity makes it easily accessible using a laparoscopic procedure. Thus, the diagnosis and management of surgical complications such as urinoma and lymphocele will be easily possible laparoscopically.

This technique also poses restrictions, the most important of which are referred to below.

(A) In the elderly, perfusion to the descending colon and sigmoid, which in case of ligation of the inferior mesenteric artery must be carried out by the collaterals, may not be sufficient and may result in ischemia of this part of the large intestine.<sup>20</sup>

(B) It is better not to utilize the inferior mesenteric artery in individuals whose internal iliac arteries have been bilaterally ligated. This may lead to disturbance and insufficiency of the rectal blood supply. For instance, one can refer to patients who have undergone radical cystectomy, or those in whom both previous grafts have been conducted using their internal iliac arteries. Of course one must note that, in order to avoid inducing impotence, the second graft is usually performed utilizing the external iliac artery. Therefore, overall, the number of patients whose inferior mesenteric artery may not be used, will be very few.<sup>9</sup>

## CONCLUSION

Utilization of the inferior mesenteric artery in conducting the third or fourth renal transplants is a suitable alternative for the aorta or the orthotopic technique. It is also technically much easier than these two methods.

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